DOCUMENT RESUME

ED 302 371 RC 016 900

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TITLE Understanding and Using Demographic Data: Terms and Measures.
PUB DATE 82
NOTE 37p.
PUB TYPE Guides - General (050) -- Reference Materials - Vocabularies/Classifications/Dictionaries (134)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Data Collection; *Data Interpretation; *Demography; *Information Utilization; *Population Education; *Statistical Data
IDENTIFIERS North Carolina

ABSTRACT

This publication provides program planners and others with information and analytical tools for using demographic data in program planning, implementation, and evaluation. The report reviews the importance of demographic data and their relevance to programs and proper implementation of laws, discusses the collection of demographic information by federal and state government agencies, explains demographic terminology, and presents some measures that can be used to describe a situation or analyze change or impact. The publication describes nine areas of demographic data: population change, age and sex composition, fertility, mortality, migration, census geography and population distribution, marital characteristics and family groups, housing, and employment and income. Each section includes a brief statement about the importance of the particular demographic concept, definitions of important measures of the concept, and equations and how to use them. The report contains 18 references which provided data on North Carolina for use in examples and sample calculations. (SV)

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# Understanding and Using Demographic Data:

# Terms and Measures

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ACKNOWLEDGEMENTS

The format for this report was suggested by Arthur Haupt and Thomas T. Kane's Population Handbook published in 1980 by the Population Reference Bureau.

Although care was taken to use accurate data for the examples of the various measures, the purpose of this publication is not to provide comparative data for North Carolina counties; rather, it is to illustrate how available data can be used.

I appreciate the editorial comments and suggestions made on earlier drafts by Thomas N. Hobgood, Vance Hamilton, Simon Garber, William B. Clifford, R. C. Wimberley, R. D. Mustian and Janie D. Shipley.

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Published by
The North Carolina Agricultural Extension Service

North Carolina State University at Raleigh, North Carolina Agricultural and Technical State University at Greensboro, and the U. S. Department of Agriculture, Cooperating. State University Station, Raleigh, N. C., Chester D. Black, Director. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. The North Carolina Agricultural Extension Service offers its programs to all eligible persons regardless of race, color, or national origin, and is an equal opportunity employer.

11/82/.9M CD-12

# INTRODUCTION

The purpose of this publication is to provide program planners and others with information and analytical tools for using demographic data in program planning, implementation and evaluation. It is designed to provide an overview of the importance of demographic data and their relevance to programs, to explain demographic terminology, and to present some measures that can be used to describe a situation or to analyze change or impact.

Demographic data are simply statistics about people--their characteristics, their lifestyle--important facts about the way they live. They include the numbers and characteristics of populations--how many people there are, their geographical distribution, and how often they migrate, marry, divorce or give birth. Demographic statistics show how many years of schooling people have, how they earn a living, their incomes, and the kind and quality of housing in an area. They demonstrate the prevalence of particular illnesses and how long people live.

The collection and distribution of statistics on population, housing, employment, education, as well as other facets of life in North Carolina, provides a rich data source for planning, implementing and evaluating various programs. Some of these statistics come from the decennial censuses, many are collected by surveys conducted by state and federal agencies, and others are collected through various registration systems.

Most demographic data are collected by the federal government and the various state governments. Most of the federal government's statistical collection is conducted by the U.S. Bureau of the Census, while responsibility for data collection and dissemination is widely distributed among various state agencies. Although they conduct many different surveys and censuses, the decennial census of population and housing is the major data collection effort of the Census Bureau. Authorization for the census is based on the constitutional mandate to apportion direct taxes and representation in Congress according to the number of people in each state. However, every census, including the first one in 1790, has collected more information than simply the number of people.

Currently, state and federal government agencies collect demographic data for three general reasons.[1] First, there are statutory provisions which use demographic data for allocating funds or for related types of action, such as grants-in-aid. There are many statutes of this type, but two familiar ones are the Smith Lever Act which funds Extension services, and the Hatch Act and Amendments which provide some funding to the North Carolina Agricultural Research Service. For example, the Smith Lever Act provides that 20 percent of

appropriated monies be distributed equally to all states, 40 percent be paid in proportion to the state's share in the total rural population of the nation, and the rest (excluding administration) be distributed on the basis of each state's farm population. Obviously, in order for these funds to be distributed, a count or census of rural and farm population by state is necessary.

Secondly, there are statutes which refer to demographic data for program administration. On the federal level, the Voting Rights Act of 1965 and the Civil Rights Act of 1964 are examples of this type. Statistics on the racial and ethnic composition of small areas within several states are used by the federal government to determine, in part, compliance with these laws. In addition, these figures are used to establish goals and monitor progress toward reaching those goals.

Finally, there are laws which clearly require demographic information for their administration, but do not specify it. Data which are collected and disseminated under the broad authority granted by the act establishing a federal or state agency can be included here.

The business community is one of the heaviest users of demographic statistics. In fact, the demand for demographic information by private businesses is so great that it has created a sizeable number of companies whose sole product is demographic information. This is not surprising, because the survival of many businesses depends on particular demographic characteristics and how these translate into a "style of life", or into specific consumer behaviors.

There are three primary uses of demographic data for anyone involved in program development, including Agricultural Extension Service personnel. First, demographic data can be used in program planning. Such data can provide the "facts" behind what many may feel to be a need for a particular kind of program. Having data that demonstrate why a particular program is being planned adds credibility to your efforts. For example, statistics on median value, density, and proportion of substandard housing can document the need for an increased emphasis on housing.

Secondly, demographic data can be used in program implementation. Specifically, data are used to estimate the target population or clientele that is to be reached by a program. Extension programs, for example, can use census data to estimate the number of low-income families with deficient diets, if they are to be a target audience.[2]

Finally, demographic data can be employed in program evaluation. What proportion of the target audience was reached by the program? Are the characteristics of actual participants similar to or different from those of

the target population? Has there been a decrease in the proportion of substandard housing since the initiation of the housing effort? The potential uses of demographic data in program evaluation are many.

---

[1]Philip M. Hauser. 1975. Social Statistics in Use. New York: Russell Sage Foundation.

[2]For example, see Deborah D. Godwin et al., "Obtaining A Representative Subgroup of Targeted Populations", Home Economics Communications Circular 3, N.C. Ag. Ext. Service, January 1982.

## BASIC TERMINOLOGY

In this section, some of the basic terms in demography are defined. These terms are representative of the simpler techniques used to analyze and interpret basic demographic events. Although the use of these terms is generally consistent among various publications and reports, it is a good policy to check how any figure has been calculated or tabulated before attempting any interpretation.

Count. The absolute number of a population or any demographic event occurring in a specified area in a specified time period. For example: there were 98,000 farmers in North Carolina in 1980; or, there were 3,646,000 live births in the United States in 1981. All statistical refinements and measures are based on counts.

Rate. Generally, a rate is the frequency of demographic events in a population in a specified time period. For example: there were 9.0 deaths per 1000 population in Cherokee County in 1980; or, there was an unemployment rate of 7.5 per 100 persons in the civilian labor force in Camden County in July 1980. Crude rates are computed for an entire population (as in the Cherokee example).

Specific rates are computed for specific subgroups, usually this is the populations at risk of having the event occur. For example, you cannot be unemployed unless you are in the labor force. Rates can be specific for any subgroup, such as age-specific, sex-specific, race-specific or occupation-specific.

Ratio. Generally, a ratio is the relation of one population subgroup to another subgroup in the same population or to the total population. The most common example is the ratio of males to females in a population.
Example: in July 1980 there were an estimated 94 males for every 100 females (6109 males ) in Chowan County in 1980.
6489 females.

Proportion. The relation of a population subgroup to the entire population; that is, the population subgroup divided by the entire population. A proportion multiplied by 100 is a percent.
Example: in 1980 an estimated 9.85 percent of North Carolinians were between the ages of 20 and 24.

Constant. An arbitrary, unchanging number, usually 100, 1000 or 100,000, by which rates, ratios or proportions are multiplied to improve understanding. For example, it is easier to understand 94 males per 100 females than it is .94 male for every female, although the figures are equivalent.

Projection. Population projections are essentially concerned with future change. Projections usually employ one or more plausible scenarios to demonstrate what the future size of a population or population subgroup may be. Projections usually do not incorporate unforeseeable events but rely on current or likely trends. If a projection is described as indicating the most likely population at a future time, it is called a forecast.

Estimate. Unlike projections, estimates make use of actual postcensal data in the form of vital statistics that are correlated with population change. Estimates are an inexpensive and less time-consuming way of determining population numbers than are censuses and surveys.

Cohort Measures. Statistics that measure events occurring to a cohort--a group of people sharing a common demographic experience. The most commonly used cohort is the birth cohort--people born in the same year or period. Other kinds of cohorts include marriage cohorts or school class cohorts.

Period Measures. Statistics that measure events occurring to all or part of the population during one period of time--"taking a snapshot" of a population. Example: the death rate of the entire North Carolina population in 1981.

## CONCEPTS AND MEASURES

In the following sections, nine areas of demographic data are discussed: population change, age and sex composition, fertility, mortality, migration, census geography and population distribution, marital characteristics and family groups, housing, and employment and income. Each section is similarly organized. First, there is a brief statement as to the importance of this particular demographic concept. Then, some important measures of the concept are defined and an example of how each is calculated is given in most cases. Each of these measures can be used in program planning, evaluation and implementation.

### Population Change

Population change has only three components--births, deaths and migration. Population numbers change as people are born, die or migrate.

#### Balancing Equation

$$P_T = P_{T-1} + (B - D) + (I - O)$$

The balancing equation is a simple expression of how population changes. The population at one time ($P_T$) is equal to the population of an earlier time ($P_{T-1}$) plus the difference between births and deaths (B - D), and the difference between in- and out-migration (I - O).

Example: population change in Alexander County between 1970 and 1980.

$$P_{80} = 19,466 + (3555 - 1746) + (3724)$$
$$P_{80} = 24,999$$

#### Natural Increase

Natural increase (or decrease) is the difference between the number of births in an area and the number of deaths in that area.

Natural Increase = B - D

For example, in Halifax County there were 9,536 births and 6001 deaths recorded during the decade of the 1970s.

Natural Increase = 9536 - 6001 = 3535

## Rate of Natural Increase

The rate of natural increase is the rate at which population is changing due to the difference in the number of births and the number of deaths in an area.

Example: in Catawba County in 1980 there were 1,437 births and 771 deaths. So the rate of natural increase would be

$$\frac{1{,}437 - 771}{105{,}209} \times 100 = .63$$

Generally, $\frac{\text{Births - Deaths}}{\text{Population at Midyear}} \times 100 = \text{Rate of Natural Increase}$

The population at midyear is used to represent an average population for the year. The rate of natural increase can also be figured using crude birth and death rates.

$$\frac{\text{Birth Rate - Death Rate}}{10} = \text{Rate of Natural Increase}$$

Example: Catawba County in 1980

$$\frac{13.6 - 7.3}{10} = .63$$

## Rate of Change

The rate of change refers to how rapidly the population is growing or declining due both to natural increase and net migration.

$$\frac{\text{Births - Deaths + Net Migration}}{\text{Total Population}} \times 100$$

For North Carolina during the 1970s,

$$\frac{892{,}010 - 476{,}311 + 374{,}319}{5{,}084{,}411} \times 100 = 15.5$$

North Carolina grew by 15.5 percent during the 1970s. The rate of change can be calculated by using the rate of natural increase and the net migration rate.

Rate of Natural Increase + Net Migration Rate = Rate of Change
In North Carolina, 8.1 + 7.4 = 15.5

## Doubling Time

A good way to demonstrate what the difference is between rates of change is to calculate doubling time. A short way to figure doubling time is to divide 70 by the annual percentage rate of growth. If North Carolina grew 1.5 percent annually then,

$$\frac{70}{1.5} = 47 \text{ years to double}$$

## Age and Sex Composition

Age and sex are the most basic characteristics of a population. Different age and sex compositions - the number and proportion of males and females in each age group - have considerable impact on the style of life in communities.

Areas with a relatively large proportion of the population in the young ages are likely to differ from areas with a relatively large proportion of older people in medical needs, consumer preferences, political participation and even crime patterns. The ability of an individual to find work, marry, or perhaps engage in certain recreational activities in a particular area may be related to that area's age and sex structure.

The age and sex composition of counties in North Carolina varies according to the relative levels of births, deaths and migration. Generally, areas with higher levels of in-migration have "younger" populations because migrants tend to be younger. Counties with a history of out-migration tend to have older populations. Exceptions to this general tendency are counties with large numbers of retirees migrating to them. These would include both mountain and coastal counties.

### Median Age

The age at which half the population is older and half is younger is a population's median age. The median age of the population of North Carolina in 1980 was 29.6.

The median age of Brunswick County was 30.5 years, while it was 24.0 years in Cumberland.

### Sex Ratio

The sex ratio is the ratio of males to females in a given population, usually expressed as the number of males for every 100 females.

The sex ratio at birth is about 105 or 106 males per 100 females. After birth, sex ratios vary because of different patterns of mortality and migration for males and females within the population.

$$\frac{\text{Number of males}}{\text{Number of females}} \times 100 = \frac{2,852,012}{3,022,417} \times 100 = 94.4$$

According to the 1980 Census, there were 94.4 males per 100 females in North Carolina.

Wake County's sex ratio was 97.5 in 1980, compared to 96.7 in 1970.

## Age-dependency Ratio

The age-dependency ratio is the ratio of persons in the so-called "dependent" ages, under 15 years of age and 65 years and over, to those in the 15 to 64 age group. Of course, not all persons in the dependent group are actually economically dependent, nor all those 15 to 64 economically productive, but this measure can give an estimate of the "economic burden" carried by those in the working ages.

$$\frac{(\text{Population Under 15} + \text{Population 65 and Over})}{\text{Population Aged 15-64}} \times 100$$

In Jones County $\frac{2282 + 1211}{6202} \times 100 = 56.3$

There were an estimated 56.3 persons in the dependent ages for every 100 working persons in Jones County in 1980.

## Population Pyramid

A population pyramid is an effective way of graphically displaying a population's age and sex composition. It is useful to think of a population pyramid as two bar graphs turned on end. One graph represents the percentage of females in each age group and the other represents the percentage of males in each age group.

On the following pages are two population pyramids, the first for Clay County and the second for Cumberland County. Both use 1980 age-sex data for whites. These pyramids illustrate the very different demographic experiences of the two counties. Clay County's pyramid is somewhat typical of a county which has experienced significant out-migration and has now "turned around" to some extent. The constriction in the pyramid (ages 40 to 44 and 45 to 49) may be due to past out-migration of this cohort at younger ages, or to lower birth rates during the 1930s. Comparison with a pyramid for Clay County constructed in 1970, for example, might show that these cohorts, then aged 30 to 40, had moved away in search of jobs or different lifestyles.

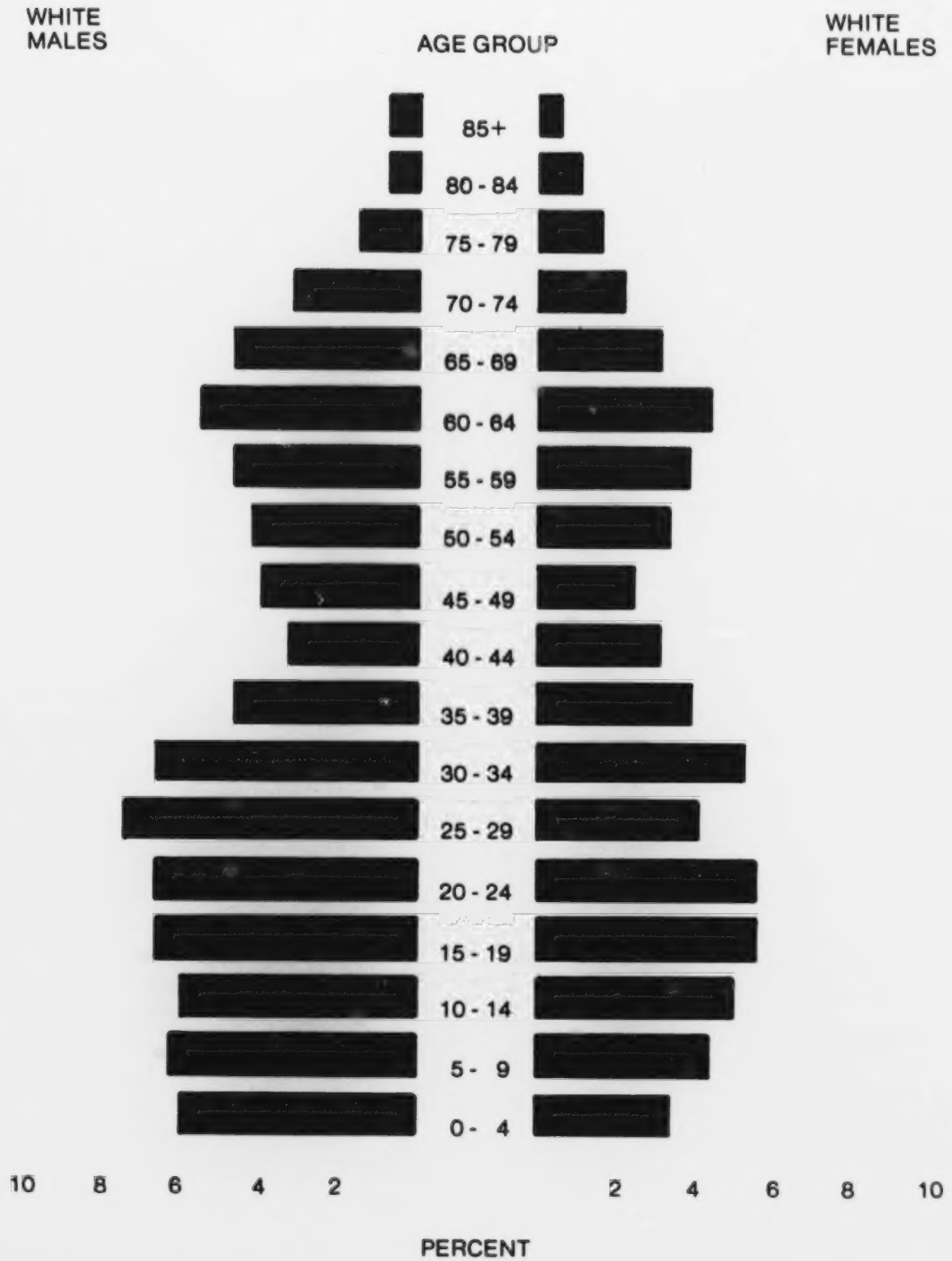
Cumberland County's pyramid is similar to those of counties with large military installations. More than 50 percent of all white males in Cumberland County are between the ages of 15 and 34.

## Comparing Populations

It is obvious that the frequency of events like migration, marriage, birth or death in a population is closely related to age composition. A population

# POPULATION PYRAMID

CLAY COUNTY 1980



# POPULATION PYRAMID

CUMBERLAND COUNTY 1980

with a high proportion of young married couples will likely have a higher crude birth rate than a population with few such couples, although the total number of people may be about the same in both populations. Similarly, a population with a large proportion of older people have proportionately more persons who are said to be "at risk" of having certain illnesses associated with old age. The concept "at risk" refers to members of a population who are subject to a particular demographic event. Everyone is at risk of dying at any point in time (some statistically more than others), but, for example, not everyone is at risk of giving birth.

One way to compare rates is to make them specific to the population at risk. For example, because child-bearing is generally limited to women 15 to 44 years of age, birth rates can be compared across populations by making them specific to that subpopulation. An age-specific birth rate would relate total births only to the population at risk, in this case women 15 to 44, instead of to the entire population. An age-specific birth rate could be further refined, for example, by limiting the at risk population only to married women between certain ages.

Increased accuracy in comparing populations can be gained by standardization of crude rates. Standardization means that crude rates for separate populations are calculated as if both populations had the same age composition. Standardization has the effect of removing the variability in crude rates due to differences in age composition. Thus, any differences in standardized rates are due to actual differences in demographic behavior.

For example, the crude death rate in Mitchell County in 1980 was 10.7. The rate for Orange County was only 5.9 in that year. Was Orange County a healthier or safer place to live than Mitchell County? In order to provide a reasonable answer to that question, the differences in the death rates due to age composition must first be removed. This difference can be removed by using the state's age composition as a standard to calculate the expected deaths in Mitchell and Orange Counties (Table 1).

TABLE 1

| Age | N. C. Population | Deaths per 1000 Mitchell | Deaths per 1000 Orange | Mitchell Expected Deaths | Orange Expected Deaths |
|---|---|---|---|---|---|
| 0- 4 | 405684 | 1.2 | 3.3 | 487 | 1339 |
| 5-14 | 928118 | 0.5 | 0.3 | 464 | 278 |
| 15-24 | 1144506 | 2.4 | 0.6 | 2746 | 687 |
| 25-34 | 968726 | 1.0 | 1.0 | 967 | 967 |
| 35-44 | 691202 | 4.2 | 2.9 | 2903 | 2004 |
| 45-54 | 602062 | 7.7 | 7.0 | 4636 | 4214 |
| 55-64 | 552584 | 11.1 | 12.1 | 6134 | 6686 |
| 65 and over | 608072 | 42.6 | 50.4 | 25904 | 30647 |
| TOTAL | 5900954 | TOTAL EXPECTED DEATHS | | 44242 | 46822 |

Age standardized death rates: Mitchell = 7.5 = $\frac{44242}{5900954}$ x 1000

Orange = 7.9 = $\frac{46822}{5900954}$ x 1000

In the above table the death rates by age for each county were multiplied by the number in that age group for the entire state. This calculation results in "expected" deaths, that is, how many deaths we would expect if the entire state had the same risk of death as Orange and Mitchell Counties. The table shows that Mitchell County, when the effect of age-composition is removed, actually has a lower death rate than does Orange County. Orange County only appears to have a more favorable death rate because it has a high proportion of residents in the younger ages which are less "at risk" of death than are older people. The lesson to be learned is that caution should be taken when comparing crude rates among counties or any other entity. Also, it is important to remember that year-to-year fluctuations do not constitute a trend.

## Fertility

Fertility, one of the components of population change, refers to the actual number and rate of births in a population. The number of live births is related to a number of social factors, including rate of marriage, age at marriage, use of contraceptive technology, status relations between males and females and the values and aspirations of couples.

### Crude Birth Rate

The crude birth rate is simply the number of births per 1000 population.

$$\text{Crude Birth Rate} = \frac{\text{Number of Births}}{\text{Total Population}} \times 1000$$

$$\frac{958}{59572} \times 1000 = 16.1$$

In Harnett County in 1980 the crude birth rate was 16.1, compared to 10.2 in Pamlico and 15.2 in Vance County.

### General Fertility Rate

The general fertility rate is a refinement of the crude birth rate. It relates the number of births to the number of women between 15 and 44 years of age.

$$\text{General Fertility Rate} = \frac{\text{Number of Births}}{\text{Women 15-44}} \times 1000$$

Example: Moore County, 1980

$$\frac{702}{11,470} \times 1000 = 61.2$$

The general fertility rate in Moore County in 1980 was 61.2, compared to 87.0 in Warren County.

### Age-Specific Fertility Rate

The age-specific fertility rate relates the number of births to women of a certain age to the total number of women in that age group.

For example:

$$\text{Age-specific Fertility Rate} = \frac{\text{Number of Births to Women 20-24}}{\text{Women 20-24}} \times 1000$$

In the United States in 1979 there were approximately 115 births per 1000 women aged 20 to 24, compared to 62 per 1000 women 30 to 34 years of age.

$$\frac{941,018}{8,182,765} \times 1000 = 115$$

## Completed Fertility Rate

The completed fertility rate, a cohort measure, is the actual number of children born per woman in a cohort of women who have ended their childbearing years. Because very few women have children after 45 years of age, that age is often considered for statistical purposes to be the end of childbearing.

## Total Fertility Rate

The total fertility rate simply represents the sum of the current age-specific fertility rates over the entire childbearing period (15 to 44). This sum demonstrates how many children would be born per woman if current age-specific rates were to remain in effect. The total fertility rate is an important measure because it gives us an indication of the results of current reproductive behavior. It can also be used to show how many children are needed to exactly replace their parents. In the United States, a total fertility rate of 2.1 exactly replaces the parents. This figure is not exactly 2.0 (one child for each parent) because of childhood deaths and because more males than females are born. Thus, if couples have an average of 2.1children, eventually each new birth would be offset by a death in the population. Due to the "momentum" built-up, a total fertility rate of less than 2.1 would not result in a declining population for many years.

The current total fertility rate in the United States is 1.8, compared to 4.8 in Mexico and 1.9 in the United Kingdom.

## Illegitimacy Ratio

The illegitimacy ratio is the percentage of live births occurring out of wedlock.

$$\text{Illegitimacy Ratio} = \frac{\text{Number of Live Births Occurring out of Wedlock}}{\text{Number of Live Births}} \times 100$$

For example: $\frac{31}{317} \times 100 = 9.8$

In 1980, 9.8 percent of all live births in Davie County occurred out of wedlock. The percentage for whites was 3.6, the non-white percentage was 53.8.

## Abortion Ratio

The abortion ratio is the number of abortions per 1000 births.

$$\frac{\text{Number of Abortions}}{\text{Total Births}} \times 1000$$

For example: $\frac{1595}{3129} \times 1000 = 509.7$

In 1980, the abortion ratio in Forsyth County was 509.7. In Pitt County the ratio was 547.0, 313.0 in Wayne County.

## Mortality

Mortality refers to the number and rate of deaths in a population. Of course, everyone eventually dies, but the rate at which death occurs in a population depends on such factors as age, sex, race, occupation and general lifestyle. The study of mortality statistics can reveal much about a population's standard of living and health care.

### Crude Death Rate

The simplest measure of mortality is the crude death rate. The crude death rate is the number of deaths in a year per 1000 total population.

$$\frac{\text{Number of Deaths}}{\text{Total Population}} \times 1000 = \text{Crude Death Rate}$$

The crude death rate in Duplin County in 1980 was 9.3, compared to 6.9 in Jackson County and 10.4 in Johnston County.

$$\frac{381}{40951} \times 1000 = 9.3$$

Like all crude rates, crude death rates should not be compared among populations without accounting for differences in age composition.

### Age-specific Death Rate

Age is the most important characteristic to be considered in mortality. Mortality rates also vary widely by sex and race, so oftentimes these rates are calculated separately for age, race and sex groups. An age-race-specific death rate could be:

$$\frac{\text{Deaths of Non-whites 44-54}}{\text{Number of Non-whites 44-54}} \times 1000$$

For example, in Anson County in 1980 the death rate for non-white 44 to 54 was 7.6, compared to 9.4 for whites 44 to 54. The death rate in Anson during 1980 was 12.4 for males and 8.3 for females.

$$\frac{7}{920} \times 1000 = 7.6$$

### Cause-specific Death Rate

For statistical purposes at least, every death has a cause, even if it is difficult to identify a single primary cause. In the United States, almost all

deaths are attributable to some cause; few are reported as due to "unknown" causes.

$$\frac{\text{Number of Deaths from Heart Disease}}{\text{Total Population}} \times 100{,}000$$

For example, there were 141 deaths due to heart disease in Onslow County during 1980.

$$\frac{141}{112{,}942} \times 1000 = 125.0$$

The rate in Pamlico county during the same year was 480.9; it was 379.0 in Buncombe.

## Percent Dying of a Specific Cause

The percent of all deaths attributable to any one cause can be calculated - for example:

$$\frac{304}{870} \times 100 = 35\%$$

Thirty-five percent of all deaths during 1980 in New Hanover county are attributable to heart disease. One of five deaths in North Carolina during 1980 was caused by cancer.

## Infant Mortality Rate

The infant mortality rate is the number of infant deaths per year per 1000 live births during the year. Infants are less than 1 year of age.

$$\text{Infant Mortality Rate} = \frac{\text{Number of Infant Deaths}}{\text{Total Live Births}} \times 1000$$

In Ashe County there were 11 infant deaths out of a total of 301 live births, for an infant mortality rate of 36.5. In Guilford County the rate was 11.1, 3.6 in Transylvania County.

The infant mortality rate is often used as an indicator of health standards or level of living. These rates vary widely according to the quality of sanitation and the availability of prenatal and other medical care. However, on a county level, there may be large fluctuations from year to year that do not comprise a significant trend.

## Life Span

Life span is the biological limit to life, the maximum number of years under optimum conditions a human being could live. The exact number of years in a human life span is not known, but it is known that very few people live beyond 100 years.

## Life Expectancy

Life expectancy is the average number of additional years a person could expect to live. It is often reported as the average number of years one could expect to live from birth. Life expectancy, which is based on age-specific death rates, varies by race and sex and is most useful when calculated separately for those groups.

In 1980, life expectancy at birth was 73.6 years for the total U.S. population. The comparable figure for white females was 78.1 years, 74.0 for non-white females, 70.5 for white males and 65.3 for non-white males. This does not mean that a white male at age 60 could expect 10.5 more years of life. Life expectancy changes as we pass the "pitfalls" of previous ages. For example, life expectancy for a white male at age 60 is about 17 more years. Of course, life expectancy is only an average, so it does not necessarily apply to any individual. Life expectancy provides the basis on which life insurance rates are calculated.

## Migration

Migration, fertility and mortality are the three components of population change. Although changes in both fertility and mortality are important, changes in migration have much to do with the magnitude of population change in most North Carolina counties.

Migration is generally defined as movement across a boundary for the purpose of taking a new residence. International migration has to do with movement across national boundaries, while internal migration is movement across boundaries within a nation.

Each move has two components: out of one area and into another. In international migration movement in is called immigration and movement out is called emigration. The simple terms in-migration and out-migration are used for internal migration.

### In-migration Rate

The in-migration rate is the number of in-migrants during a specified time period per 1000 population residing in the destination area.

$$\frac{\text{Number of In-migrants}}{\text{Total Population at Destination}} \times 1000$$

Note that this rate does not take into account the "at risk" population, but is concerned with impact on the local area. The population at risk of in-migration to a specific county could be the rest of the country or world.

### Out-migration Rate

The out-migration rate is the number of out-migrants during a specified period per 1000 population residing in the area of origin.

$$\frac{\text{Number of Out-migrants}}{\text{Population of Area of Origin}} \times 1000$$

Annual data on the numbers of in- and out-migrants are generally not available. The 1980 U.S. Census included a question on residence as of 5 years ago. By comparing past residence with current residence, migration patterns over the 5-year period can be determined. Estimates of in and out-migration over shorter time periods are sometimes made by examining employment growth or decline and data from public utilities, including the number of telephone, gas or water service starts and stops.

## Net Migration

Net migration is simply the difference between the number of in-migrants to an area and the number of out-migrants from that same area. Calculation of net-migration rates requires the same denominator, so the net-migration rate for one area is generally not the difference between the in- and out-migration rates presented above, although it could be.

If the number of births and deaths during a period are known and the population totals at the beginning and end of the period are known, then net migration can be calculated by use of the balancing equation discussed on page 6.

> For example, consider population change in Alexander County between 1970 and 1980. The total population in 1970 was 19,466 and 24,999 in 1980. There were 3,555 births and 1,746 deaths during the decade.
>
> 24,999 - 19,466 = 5,533-total change
> 3,555 - 1,746 = 1,809-natural increase
> 5,533 - 1,809 = 3,724-net migration
>
> Subtracting the amount of change due to natural increase from the total change results in the amount of net migration during the period.

## Census Geography and Population Distribution

The style and quality of life of people depend to some extent on how the population is distributed across the landscape. In North Carolina, the population is distributed more evenly than in other states, yet it is still relatively dense in some places and sparse in others.

### Density

The simplest expression of population is the number of people per square mile or acre.

$$\frac{\text{Total Population}}{\text{Total Land Area}} = \text{Population Density}$$

For example, Edgecombe County had a 1980 population of 55,988 on 327,000 acres.

$$\frac{55{,}988}{327{,}000} = 17 \text{ persons per 100 acres}$$

In contrast, Mecklenburg had 116 persons per 100 acres; Jones had about 3 persons per 100 acres.

This measure of density does not take into account population distribution within a county, only total numbers and total acres or square miles.

### Census Geography

The 1980 Census of Population and Housing plans to report data for several different political and statistical areas. According to the U.S. Bureau of the Census[3] data will be reported for:

- The United States. The 50 states and the District of Columbia, plus outlying areas under U.S. Sovereignty or jurisdiction.

- Regions and Divisions. There are four census regions (West, South, Northeast and North Central) defined for the United States and each are composed of two or more geographic divisions. North Carolina is in the Southern region, South Atlantic division.

- Standard Metropolitan Statistical Areas (SMSA's). These usually consist of a central city with a population exceeding 50,000, the county(ies) in which it is located, and other contiguous counties that are metropolitan in character and are socially and economically integrated with the central city.

• Urbanized Areas (UA's). A UA consists of a city and surrounding densely-settled territory with a combined population of 50,000 or more inhabitants.

• Urban/Rural. The urban population consists of all persons living in urbanized areas and in places of 2,500 or more inhabitants outside these areas. Everyone else is considered as residing in a rural area.

• Census - Designated Places (CDP's). Formerly known as unincorporated places, these concentrations of population are not incorporated as cities, towns or villages. The Census Bureau defines them, with local assistance, for statistical purposes.

• Census Tracts. Statistical subdivisions of a SMSA. Ideally, they contain about 4,000 residents and are delineated by local committees.

• Enumeration Districts (ED's). With an average population of 800 to 1,000, ED's are subdivisions of townships. ED's do not cross the boundary of any other census geographical area except for blocks. Any incorporated city, regardless of size, must be equivalent to one or more ED's.

• Blocks. These units, generally bounded by streets and other physical features, are defined and numbered in urbanized areas and in other places that contract with the Census Bureau for the collection of block statistics. For 1980, block statistics will be available for all incorporated places with a population of 10,000 or more.

• Block Groups. City blocks in block-numbered areas are grouped into units of about 1,000 inhabitants each for tabulation purposes in lieu of ED's.

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[3]U.S. Bureau of the Census. "Factfinder for the Nation." CFF No. 8, February 1980.

## Marital Characteristics and Family Groups

As we have seen, age and sex are biological characteristics that have important demographic effects. Marital status and family composition are social characteristics that also have important consequences for population change or dynamics. Marital status has a great impact on fertility, and a substantial influence on migration and mortality. Family status may affect other social and economic characteristics, such as school attendance and labor force participation. Most importantly, because reproduction is a process that largely takes place through the formation of families, it is appropriate to examine rates of family formation and dissolution.

### Marriage Rate

The marriage rate is simply the number of marriages per 1,000 total population in a given period.

$$\text{Marriage Rate} = \frac{\text{Number of Marriages}}{\text{Total Population}} \times 1000$$

$$\frac{232}{10280} \times 1000 = 22.6$$

In Swain County in 1980 the marriage rate was 22.6. In Rutherford the rate was 5.4, 13.5 in Dare County.

### Median Age at First Marriage

Half the people marrying for the first time in a given year were younger than the median age, half older. The median age at first marriage is usually computed separately for males and females, because females typically marry at younger ages.

### Divorce and Annulment Rate

The divorce and annulment rate indicates the number of divorces and annulments per 1,000 population in a given year.

$$\text{Divorce and Annulment Rate} = \frac{\text{Number of Divorces and Annulments}}{\text{Total Population}} \times 1000$$

$$\frac{237}{59451} \times 1000 = 4.0$$

There were 4.0 divorces and annulments per 1,000 people in Surry County in 1980. Comparable rates in Gaston and Polk Counties were 5.4 and 4.5.

## Families

Family composition is an obviously important facet of life, one that has many important demographic effects. However, many concepts related to the family are somewhat difficult to define for statistical reporting. For example, what is a family? There is a wide range of groups in our society that might be called a family. The U.S. Census Bureau uses the following definitions:[4]

• Living arrangements. Living arrangements may be in households or in family quarters. A household is comprised of all persons who occupy a housing unit, that is, a house, an apartment or other group of rooms, or a room that constitutes "separate living quarters". A household includes the related family members and all the unrelated persons, if any, who share the housing unit. A person living alone or a group of unrelated persons sharing the same housing unit is counted as a household. The Census Bureau has termed one such arrangement POSSLQ (Persons of Opposite Sex Sharing Living Quarters).

• Householder. This term replaces "head of household" and "head of family". In the past the husband was always classified as the head in married-couple families. Now "householder" refers to the first listed adult in the census questionnaire.

• Family. The term family refers to a group of two or more persons related by blood, marriage or adoption and residing together in a household. A primary family includes among its members the person or couple who maintains the household. A secondary family is comprised of two or more persons such as guests, lodgers, or resident employees and their relatives living in a household and related to each other but not to the person or couple who maintains the household.

• Subfamily. A subfamily consists of a married couple and their children, if any, or one parent with one or more unmarried children under 18 years old living in a household and related to the person or couple who maintains the household. Subfamilies are counted as part of the primary family with whom they live.

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[4]U.S. Bureau of the Census. 1981. Census '80: Projects for Students.

## Housing

The kind and quality of housing in an area has a large impact on the lifestyle of the people residing in that location. Whether single-family or multi-family housing predominates, the amount of substandard housing, and the cost of housing are closely related to the way the population lives.

### Average Persons Per Unit

Average persons per unit is calculated by dividing the total population by the total number of housing units.

$$\frac{\text{Total Population}}{\text{Total Number of Housing Units}} = \text{Average Persons Per Unit}$$

$$\frac{72,788}{27,533} = 2.6$$

In Burke County in 1980 there were 2.6 people per housing unit. There were 2.5 persons per unit in Forsyth County and 2.1 in Pamlico County during the same year.

### Percent of Year-round Units

Counties with extensive second-home development will have a lower percentage of housing that is occupied year-round. In most cases, the number of year-round housing units will be close to the total number of housing units.

$$\text{Percent of Year-round} = \frac{\text{Year-round Housing Units}}{\text{Total Housing Units}} \times 100$$

$$\frac{38,080}{38,115} \times 100 = 99.9$$

In Alamance County 99.9 percent of all housing units are year-round units. In Transylvania, 90.9 percent of all units are year-round and 55.5 percent of all units in Dare County are year-round.

Many housing characteristics are reported for year-round housing units only. All of the following calculations are based on year-round housing.

### Median Rooms

Half of all year-round housing units have more than the median number of rooms, half have less. There is little variation among North Carolina counties

on median rooms. In 1980 only 5 counties (Burke, Cherokee, Jackson, Orange, Swain) had a median of less than 5 rooms per unit, and all of these counties had either 4.8 or 4.9. The median for the entire state was 5.1; Camden County was high with a median of 5.6 rooms per unit.

Percent Lacking Complete Plumbing for Exclusive Use

The percent lacking complete plumbing for exclusive use varies considerably among North Carolina counties. "Complete plumbing" is defined by the Census as hot and cold piped water, a flush toilet and a bathtub or shower.

$$\frac{\text{Number of Housing Units Without Complete Plumbing for Exclusive Use}}{\text{Year-round Housing Units}} \times 100$$

In 1980, 21.2 percent of Northampton County's year-round housing units lacked complete plumbing for exclusive use. Comparable figures were 1.4 for Durham County and 10.5 for Chatham County.

Year-round housing units are classified as occupied or vacant by the U.S. Census Bureau at the time of the decennial census. Occupied units are subdivided into owner- and renter-occupied.

Percent Owner- or Renter-occupied

The percent owner-occuped demonstrates the proportion of rented or owned and occupied housing.

$$\frac{3,299}{5,059} \times 100 = 65.2$$

In 1980, 65.2 percent of Greene County's occupied housing was owner-occupied, 34.8 percent was renter-occupied. In Clay County 85.9 percent was owner-occupied, 14.1 percent was renter-occupied.

Median Value/Rent

For owner-occupied units, one-half have a higher value than the median, one-half have less. For rental units, half have a higher rent than the median, half less.

The median value of an owner-occupied unit in Chowan County in 1980 was $32,300 and median rental was $77. In Wake County comparable figures were $53,500 and $192.

## Vacancy Rate

The vacancy rate is the percent of homeowner or rental units that were vacant at the time of the survey.

In 1980, 2 percent of Pender County's owned units were vacant and 12.1 percent of rental units were vacant. Comparable figures for Washington County were 2.6 and 22.0.

## Percent Overcrowded Housing

Overcrowded housing is defined by the Census as more than one person per room.

$$\frac{\text{Number of Overcrowded Housing Units}}{\text{Total Occupied Units}} \times 100$$

$$\frac{226}{4826} \times 100 = 4.7$$

In 1980, 4.7 percent of Avery County housing was classified as overcrowded. Comparable figures were 9.3 in Bertie County and 3.6 in Clay County.

## Employment and Income Characteristics

Understanding the characteristic ways in which people in a particular area make a living is important in understanding their total lifestyle. Areas become known by the kinds of industry or typical occupations found there; for example, there are textile towns, agricultural counties or business centers. Sanford is called the "Brick Capital", Durham the "City of Medicine", and Kannapolis is known for its textile employment.

The amount of available income is also important to an understanding of an area's way of life. Whether many residents live close to or below the level of income needed for food, shelter and clothing, or whether they have large amounts of discretionary income is obviously important to a locale. How that income is earned and how it is distributed among population subgroups are also factors that should be understood.

The labor force is generally defined as that part of the population which actually engages, or attempts to engage, in the production of economic goods and services. Reference is often made to the "civilian labor force", which includes those persons 16 years old and over in the labor force but not on active duty in one of the military services. All persons 16 years old and over who are not classified as members of the labor force are defined as "not in labor force". This category consists mainly of students, housewives, retirees, inmates of institutions, disabled people and certain seasonal workers. Everyone who is in the labor force is either employed or unemployed.

### Labor Force Participation Rate

Provisional labor force estimates for 1980 show that 65.1 percent of persons 16 years and over in North Carolina were in the labor force.

$$\frac{\text{Labor Force}}{\text{Population 16 Years and Over}} \times 100$$

$$\frac{2,891,436}{4,441,781} \times 100 = 65.1$$

Comparable figures were 71.4 in Nevada and 59.3 in New York. Of these 2,891,436 in North Carolina, 108,395 were in the armed forces, leaving 2,783,041 in the civilian labor force.

### Unemployment Rate

In the week before the 1980 U.S. Census 156,226 people were unemployed in North Carolina.

$$\frac{156,226}{2,783,041} \times 100 = 5.6$$

$$\frac{\text{Number Unemployed}}{\text{Civilian Labor Force}} \times 100 = \text{Unemployment Rate}$$

Labor force participation and unemployment rates are often calculated by sex for different age and race groups. In North Carolina in 1980 provisional estimates show that 55 percent of women 16 years and over were in the labor force. Of those women in the civilian labor force (99.6%), 6.3 percent were unemployed.

With the rapid changes of participation by women in the labor force there has been increased interest as to possible impacts of this trend on child-rearing practices.

## Percent Working Mothers, Children Under 6 Years

This is simply the number of women in the labor force with children under 6 divided by the total number of women with children under 6.

$$\frac{199,531}{339,099} \times 100 = 58.8$$

In North Carolina in 1980 almost 59 percent of mothers with children under 6 were in the labor force.

## Class of Worker

The Census Bureau delineates six general classes of employed workers. These classes and the estimated percent of total employment for each are shown below.

Class of Workers, North Carolina, 1980

| Class of Employed Workers | Percent of Employed Workers |
|---|---|
| Private wage and salary | 75.7 |
| Federal government | 2.8 |
| State government | 7.1 |
| Local government | 6.9 |
| Self-employed | 6.9 |
| Unpaid family workers | 0.6 |

Industry and occupation are two important employment characteristics. Occupation refers to the kind of work done, industry refers to the kind of activity carried out by the establishment in which the person works. For example, the occupation of accountant could be found in many different types of industry, such as in education, construction or retail trade. Estimated percentages for six occupational groups and the industrial groups are shown below.

Occupational Structure, North Carolina, 1980

| Occupational Group | Percent of Employed Workers |
|---|---|
| Managerial and Professional | 19.7 |
| Technical, Sales and Administrative Support | 26.3 |
| Service | 10.7 |
| Farming, Forestry, Fishing | 3.3 |
| Precision Production, Craft and Repair | 13.6 |
| Operators, Fabricators and Laborers | 26.4 |

Industrial Structure, North Carolina, 1980

| Industrial Group | Percent of Employed Workers |
|---|---|
| Agriculture, Forestry, Fisheries, Mining | 3.6 |
| Construction | 6.2 |
| Manufacturing | 31.7 |
| Transportation | 3.6 |
| Communications and Other Public Utilities | 2.8 |
| Wholesale and Retail Trade | 18.9 |
| Finance, Insurance, Real Estate | 4.2 |
| Services (including business, health, entertainment, education) | 24.9 |
| Public Administration | 4.1 |

The 1980 Census will report for counties 1979 income levels for individuals (per capita), household and families. Provisional data are currently available for the state. Household income includes income from all households, whether family or non-family. (See page 26 for this distinction.) Family income refers to income received by members of family households only.

## Household Income in 1979, North Carolina

| Income Level | Percent of Households |
|---|---|
| Less than $10,000 | 32.9 |
| $10,000 to $14,999 | 17.5 |
| $15,000 to $19,999 | 16.0 |
| $20,000 to $24,999 | 12.7 |
| $25,000 to $34,999 | 12.6 |
| $35,000 to $49,999 | 5.7 |
| $50,000 or more | 2.6 |

Median Household Income - $14,876
Mean Household Income - $17,513

## Family Income in 1979, North Carolina

| Income Level | Percent of Families |
|---|---|
| Less than $10,000 | 24.7 |
| $10,000 to $14,999 | 17.6 |
| $15,000 to $19,999 | 17.8 |
| $20,000 to $24,999 | 14.8 |
| $25,000 to $34,999 | 15.2 |
| $35,000 to $49,999 | 6.9 |
| $50,000 or more | 3.0 |

Median Family Income - $17,042
Mean Family Income - $19,583

## Families Below Poverty Level Income

Of the estimated 1,578,930 families in North Carolina in 1980, 177,477 had incomes below the designated poverty level.

$$\frac{177,477}{1,578,930} \times 100 = 11.2 \text{ percent below poverty level income}$$

In 1980, 11.2 percent of North Carolina families had incomes below the designated poverty level.

## DATA REFERENCES


Davis, A. Clarke and William B. Clifford (forthcoming). North Carolina's Changing Population: A Look at Three Decades. Agricultural Research Service, NCSU, Raleigh.

Godwin, Deborah D., Nancy Baird, Bettye Rose Connell, and Sarah M. Shoffner. 1982. "Obtaining a Representative Subgroup of Targeted Populations", Home Economics Communications Circular 3, N. C. Agricultural Extension Service, Raleigh, N. C.

Haupt, Arthur and Thomas T. Kane. 1980. Population Handbook. Washington, D.C.: Population Reference Bureau.

Hauser, Philip M. 1975. Social Statistics in Use. New York: Russell Sage Foundation.

National Center for Health Statistics. 1981. Monthly Vital Statistics Report, "Advance Report of Final Natality Statistics, 1979", Vol. 30, No. 6, Supplement (2), September 29.

National Center for Health Statistics. 1981. Monthly Vital Statistics Report "Annual Summary of Births, Deaths, Marriages, and Divorces: United States, 1980", Vol. 29, No. 13, Sept. 17.

N. C. Office of State Budget and Management. 1982. "Estimated Population, July 1, 1980, by Age, Race, and Sex." (printout), Raleigh, N. C.

N. C. Office of State Budget and Management. 1982. "Overcrowded and Housing Lacking Complete Plumbing" (printout), Raleigh, N. C.

N. C. Office of State Budget and Management. 1981. Profile, North Carolina Counties. Sixth Edition. Raleigh, N. C.

N. C. Office of State Budget and Management. 1982. "State Data Center Newsletter", Vol. 4, No. 3, February, Raleigh, N. C.

N. C. State Center for Health Statistics. 1981. Leading Causes of Mortality. North Carolina Vital Statistics 1980, Vol. 2, (Abbreviated) Raleigh, N. C.

North Carolina Department of Human Resources. 1982. North Carolina Reported Abortions 1980. Raleigh, N. C.

North Carolina Department of Human Resources. 1981. North Carolina Vital Statistics 1980, Vol. 1. Raleigh, N. C.

North Carolina State Data Center. 1982. "1980 Census of Population and Housing" (printout) Raleigh, N. C.

U. S. Bureau of the Census. 1980. "Factfinder for the Nation." CFF No. 8, February.

U. S. Bureau of the Census. 1981. Census '80: Projects for Students.

U. S. Bureau of the Census. 1982. 1980 Census of Population. Vol. 1. Characteristics of the Population. PC 80-1-A35 (North Carolina).

U. S. Bureau of the Census. 1982. 1980 Census of Population and Housing. Provisional Estimates of Social, Economic, and Housing Characteristics. PHC80-S1-1.